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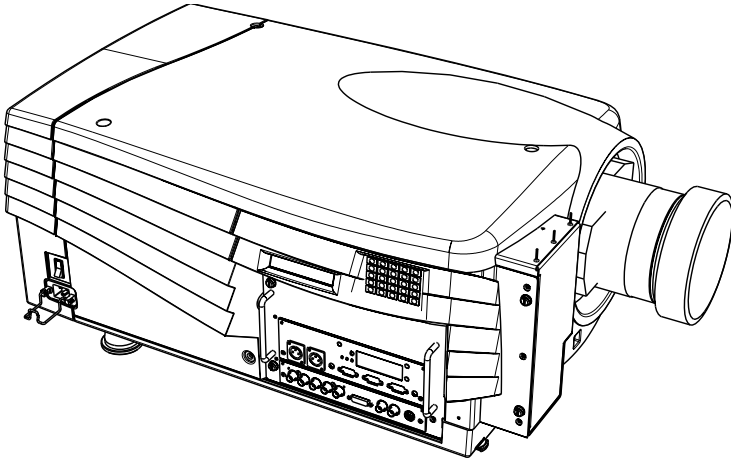

GALAXY WARP™

R9040320

SERIAL COMMUNICATIONS BASIC USER'S MANUAL

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1. SERIAL COMMUNICATIONS BASICS

Overview

- Serial Communications Protocol
- Data Words
- Communication Settings
- Serial Communications Hardware
- Serial Communications Syntax

1.1 Serial Communications Protocol

Communication Protocol Summary

Like every communication method the serial communication uses a particular protocol (ANSI) which must be respected in order to allow communication to take place, following table gives a summary of the predefined communication terms.

Start byte	\xfe
Projector address	
Command byte(s)	
Data bytes[1]	
Checksum byte	
Stop byte	\xff

ANSI

American National Standards Institute

Start Byte

The “Start byte” informs the projector (in case of transmission) or the computer (in case of reception) that a new data transfer will take place

Projector Address

The “projector address” defines the address of the computer the projector wants to talk to (in case of transmission) or the address of the projector that answers (in case of reception).

The maximum number of projectors that can be addressed by one computer is 256.

Command Byte(s)

There is at least one command byte to define the action to be performed. Commands that are not often used or complex commands can take more than one byte. All command bytes that are sent by the computer to get information out of the projector are repeated in the answer-data-transfer of the projector.

Data Bytes (Optional)

Whether the command bytes are followed by one or more data bytes depends on the contents of the command bytes.

Data which contains more than one byte is called a word and can also be signed or unsigned.

Some commands do not require a data field(s).

Checksum Byte

The “Checksum byte” is used to detect errors during transmission or reception

```
Checksum byte = (projectoraddress + command bytes + Data bytes) Modulo \x100
```

Stop Byte

The “Stop byte” informs the projector (in case of transmission) or the computer (in case of reception) that the data transfer is complete and that the interpretation of the command and data bytes can start.

Acknowledge

If the communication link and if the sent commands can be interpreted by the projector an “ACK” command is sent back. In case the commands cannot be interpreted a “NACK” command is sent back.

1. optional

Note

Any command byte, data byte or checksum byte that equals `\x80, \xfe, \xff` has to be converted!

1. Transmission
   - instead of `\x80`, send `\x80` followed by `\x00`
   - instead of `\xfe`, send `\x80` followed by `\x7e`
   - instead of `\xff`, send `\x80` followed by `\x7f`
2. Reception
   - replace `\x80` followed by `\x00` with `\x80`
   - replace `\x80` followed by `\x7e` with `\xfe`
   - replace `\x80` followed by `\x7f` with `\xff`

1.2 Data Words

msb

The **m**ost **s**ignificant **b**yte, is the byte with the greatest weight (value).

lsb

The **l**ess **s**ignificant **b**yte, is the byte with the smallest weight (value).

Description

A word contains more than one byte, the first byte is the msb, the last byte is the lsb.

Examples of Data Words

- The projector runtime parameter is described using an unsigned double word where 2 bytes (msb ...lsb) represent the value of the runtime in seconds.

How to calculate the value of a word ?

Lets take the example of a double word returned by the “**projector runtime, read**” commando.

returned data = Data[0]....Data[3]

value = Data[0]*256^3 + Data[1]*256^2 + Data[2]*256 + Data[3].

1.3 Communication Settings

Baud rate

Defines the speed of the data transfer. The baud rate can be set using the menu structure.

Consult the Owner's manual of the projector on how to change the baud rate setting.

Data Bits

Eight data bits are used for each character of the data transfer.

Parity

There is no parity bit used to perform error checking.

Stop Bits

One stop bit is used to define the end of a character.

1.4 Serial Communications Hardware

Overview

- Female D9–pin connector labelled “RS232 IN” used to connect the projector with the computer.

Pin out of the D9 connector:

Pin	Name	Full Name
1	CD	Carrier Detect
2	RxD	Received Data
3	TxD	Transmitted Data
4	DTR	Data Terminal Ready
5	GND	Signal Ground
6	DSR	Data Set Ready
7	RTS	Request To Send
8	CTS	Clear To Send
9	RI	Ring Indicator

- Standard serial Cable
  - order number R9827560 (cable length = 15m)
  - order number R9827570 (cable length = 30m)

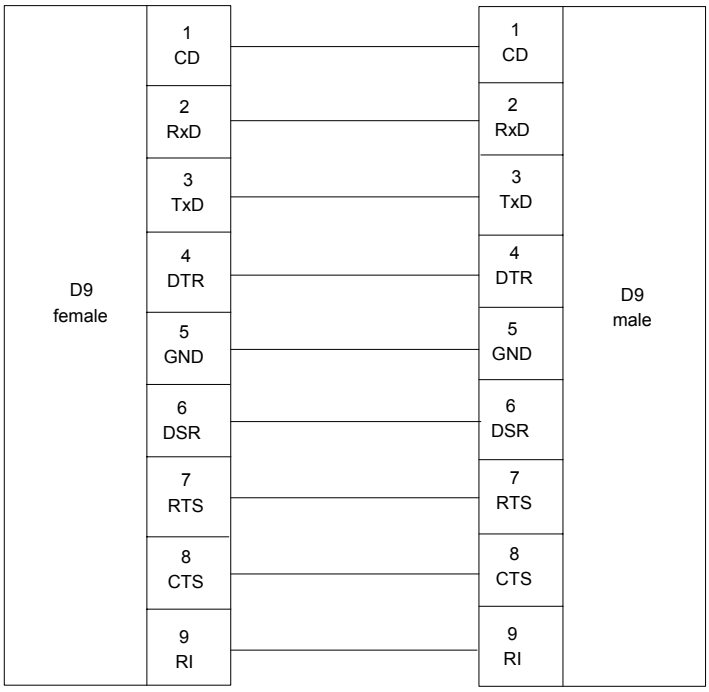

Image 1-1
connection: IBM PC or compatible → projector

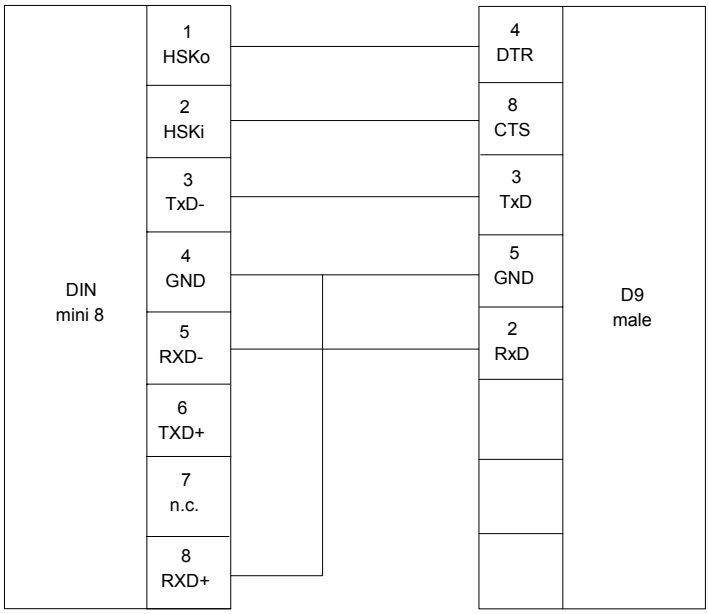

Image 1-2
connection: MAC → projector

Signal Levels

Following table gives the signal levels corresponding to the different states:

State	Voltage
Off = 1	-9V
On = 0	+9V

1.5 Serial Communications Syntax

Characters

In this manual, all characters are expressed using the C-Language syntax:

decimal values	**ddd**[2]
hexadecimal values	\x**hh**[3]

Negative Values/Numbers

The 2s complement number system is used to express negative numbers

Pascal-language string

A Pascal-language string consists of one or more characters. The first character of the string contains the length of the string. Therefore, a Pascal-language string is limited to 255 characters.

Pascal string 'Hello world"

length	\x0b
'h'	\x68
'e'	\x65
'l'	\x6c
'l'	\x6c
'o'	\x6f
"	\x20
'w'	\x77
'o'	\x6f
'r'	\x72
'l'	\x6c
'd'	\x64

C-language string

A C-language string consists of one or more characters. The last character of the string is always the NULL character \x00. Therefore, the length of a C-language string is determined by the position of the NULL character...

C string 'Hello world"

'h'	\x68
'e'	\x65
'l'	\x6c
'l'	\x6c
'o'	\x6f
"	\x20
'w'	\x77
'o'	\x6f
'r'	\x72
'l'	\x6c

2. ddd=0...255
3. hh=00...ff

'd'	\x64
NULL	\x00

Standard File

Predefined file stored in read-only memory

Custom File

File created by the user and stored in non-volatile read write memory

Filename

A filename is specified as a C-Language string. This string has to follow some rules:

x	x	x	x	x	x	x	x	.	y	z	z	NULL

1. Length string = 12
2. x = character of the base name formed by max 8 characters
3. y = kind of file (= 1 character)

's'	standard file
'c'	custom file

4. z = file index (= 2 characters: 0..9)
   zz specifies the location in memory where the file is stored.
   - for standard files: zz = 00...maximum standard files
   - for custom files: zz = 00...63 where 00 is reserved for the file 'none .c00' (file which is loaded when no signal is applied)
5. yzz is a unique combination. In other words, no two files can exist with the same extension yzz.

To specify more than one file you can use the question mark (?) and (*) wildcard character for x, y and z (or any other character).

?: This wildcard character can represent any possible character on a particular location.

*** : This wildcard character can represent any possible character(s) following the wildcard's position in the string.**

- "ntsc .c01"
- "svga_60v.s?7"
- "????????.???"
- "sv*.*"

2. RS232 COMMANDS

Overview

- Dynacolor™, Read
- Dynacolor™, Write
- Dynacolor™, Off
- Dynacolor™, On
- Dynacolor™, Status
- Dynacolor™, Execute Linked

2.1 Dynacolor™, Read

General Information

DynaColor™ will eliminate channel-to-channel color variations. How to define color? The CIE chromaticity diagram is one way to plot the colors the human eye can see. A projector can only reproduce a certain color gamut within this diagram. This color gamut is defined by the triangle formed by the x, y coordinates of Red Green and Blue. These parameters are used by the DynaColor™ adjustment in the BarcoReality SIM 4. Due to the tolerance on optical components the x, y values of this color gamut of each projector will differ. When working with a multichannel setup, these color differences between different projectors can be smooth out by matching the color gamuts of the different projectors to a Common Color Gamut.

Description

Read the Dynacolor™ values of the projector.

Following values are available:

- Measured Points: x, y coordinates + Y (Luminance)
- Desired Points: x, y coordinates

Command

Command [0]	\xfe
Command [1]	\x15
Command [2]	\x08

Retrun Data

Data [0]	Measured Red x msb Coordinate
Data [1]	Measured Red x lsb Coordinate
Data [2]	Measured Red y msb Coordinate
Data [3]	Measured Red y lsb Coordinate
Data [4]	Measured Red Y msb Value
Data [5]	Measured Red Y lsb Value
Data [6]	Measured Green x msb Coordinate
Data [7]	Measured Green x lsb Coordinate
Data [8]	Measured Green y msb Coordinate
Data [9]	Measured Green y lsb Coordinate
Data [10]	Measured Green Y msb Value
Data [11]	Measured Green Y lsb Value
Data [12]	Measured Blue x msb Coordinate
Data [13]	Measured Blue x lsb Coordinate
Data [14]	Measured Blue y msb Coordinate
Data [15]	Measured Blue y lsb Coordinate
Data [16]	Measured Blue Y msb Value
Data [17]	Measured Blue Y lsb Value
Data [18]	Measured White x msb Coordinate
Data [19]	Measured White x lsb Coordinate
Data [20]	Measured White y msb Coordinate
Data [21]	Measured White y lsb Coordinate
Data [22]	Measured White Y msb Value

Data [23]	Measured White Y lsb Value
Data [24]	Desired Red x msb Coordinate
Data [25]	Desired Red x lsb Coordinate
Data [26]	Desired Red y msb Coordinate
Data [27]	Desired Red y lsb Coordinate
Data [28]	Desired Green x msb Coordinate
Data [29]	Desired Green x lsb Coordinate
Data [30]	Desired Green y msb Coordinate
Data [31]	Desired Green y lsb Coordinate
Data [32]	Desired Blue x msb Coordinate
Data [33]	Desired Blue x lsb Coordinate
Data [34]	Desired Blue y msb Coordinate
Data [35]	Desired Blue y lsb Coordinate
Data [36]	Desired White x msb Coordinate
Data [37]	Desired White x lsb Coordinate
Data [38]	Desired White y msb Coordinate
Data [39]	Desired White y lsb Coordinate

Real Coordinate Value = (msb x 256 + lsb) / 1000

Real Y Value = (msb x 256 + lsb) / 1000

2.2 Dynacolor™, Write

Description

Send the Dynacolor™ values to the projector.

Command

Command [0]	\xfe
Command [1]	\x15
Command [2]	\x06

Data

Data [0]	Measured Red x msb Coordinate
Data [1]	Measured Red x lsb Coordinate
Data [2]	Measured Red y msb Coordinate
Data [3]	Measured Red y lsb Coordinate
Data [4]	Measured Red Y msb Value
Data [5]	Measured Red Y lsb Value
Data [6]	Measured Green x msb Coordinate
Data [7]	Measured Green x lsb Coordinate
Data [8]	Measured Green y msb Coordinate
Data [9]	Measured Green y lsb Coordinate
Data [10]	Measured Green Y msb Value
Data [11]	Measured Green Y lsb Value
Data [12]	Measured Blue x msb Coordinate
Data [13]	Measured Blue x lsb Coordinate
Data [14]	Measured Blue y msb Coordinate
Data [15]	Measured Blue y lsb Coordinate
Data [16]	Measured Blue Y msb Value
Data [17]	Measured Blue Y lsb Value
Data [18]	Measured White x msb Coordinate
Data [19]	Measured White x lsb Coordinate
Data [20]	Measured White y msb Coordinate
Data [21]	Measured White y lsb Coordinate
Data [22]	Measured White Y msb Value
Data [23]	Measured White Y lsb Value
Data [24]	Desired Red x msb Coordinate
Data [25]	Desired Red x lsb Coordinate
Data [26]	Desired Red y msb Coordinate
Data [27]	Desired Red y lsb Coordinate
Data [28]	Desired Green x msb Coordinate

Data [29]	Desired Green x lsb Coordinate
Data [30]	Desired Green y msb Coordinate
Data [31]	Desired Green y lsb Coordinate
Data [32]	Desired Blue x msb Coordinate
Data [33]	Desired Blue x lsb Coordinate
Data [34]	Desired Blue y msb Coordinate
Data [35]	Desired Blue y lsb Coordinate
Data [36]	Desired White x msb Coordinate
Data [37]	Desired White x lsb Coordinate
Data [38]	Desired White y msb Coordinate
Data [39]	Desired White y lsb Coordinate

Real Coordinate Value = (msb x 256 + lsb) / 1000

Real Y Value = (msb x 256 + lsb) / 1000

2.3 Dynacolor™, Off

Description

Disable the Dynacolor™ adjustment.

Command

Command [0]	\xfd
Command [1]	\x15
Command [2]	\x0A

2.4 Dynacolor™, On

Description

Enable the Dynacolor™ adjustment.

Command

Command [0]	\xfd
Command [1]	\x15
Command [2]	\x09

2.5 Dynacolor™, Status

Description

Read the current status of the Dynacolor™ adjustment.

Command

Command [0]	\xfd
Command [1]	\x15
Command [2]	\x10

Return Data

Data [0]	Current Dynacolor™ Status: • \x00 = Dynacolor™ is not active • \x01 = Dynacolor™ is active

2.6 Dynacolor™, Execute Linked

Description

This will execute the Linked Dynacolor™ command, all projectors in the linked setup will be set to their Common Color Gamut.

Command

Command [0]	\xfd
Command [1]	\x15
Command [2]	\x0F

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Revision Sheet

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